LALP-96-36
March 1996

Los Alamos
NATIONAL LABORATORY

Summary of

Environmental Surveillance at Los Alamos during 1994

Contents

Introduction to the Los Alamos National Laboratory

Linking the Rio Grande Valley and the Jemez Mountains, New Mexico's Pajarito Plateau is home to a world-class scientific institution. Los Alamos National Laboratory (or the Laboratory), managed by the Regents of the University of California, is a government-owned, Department of Energy-supervised complex investigating all areas of modern science for the purposes of national defense, health, conservation, and ecology.

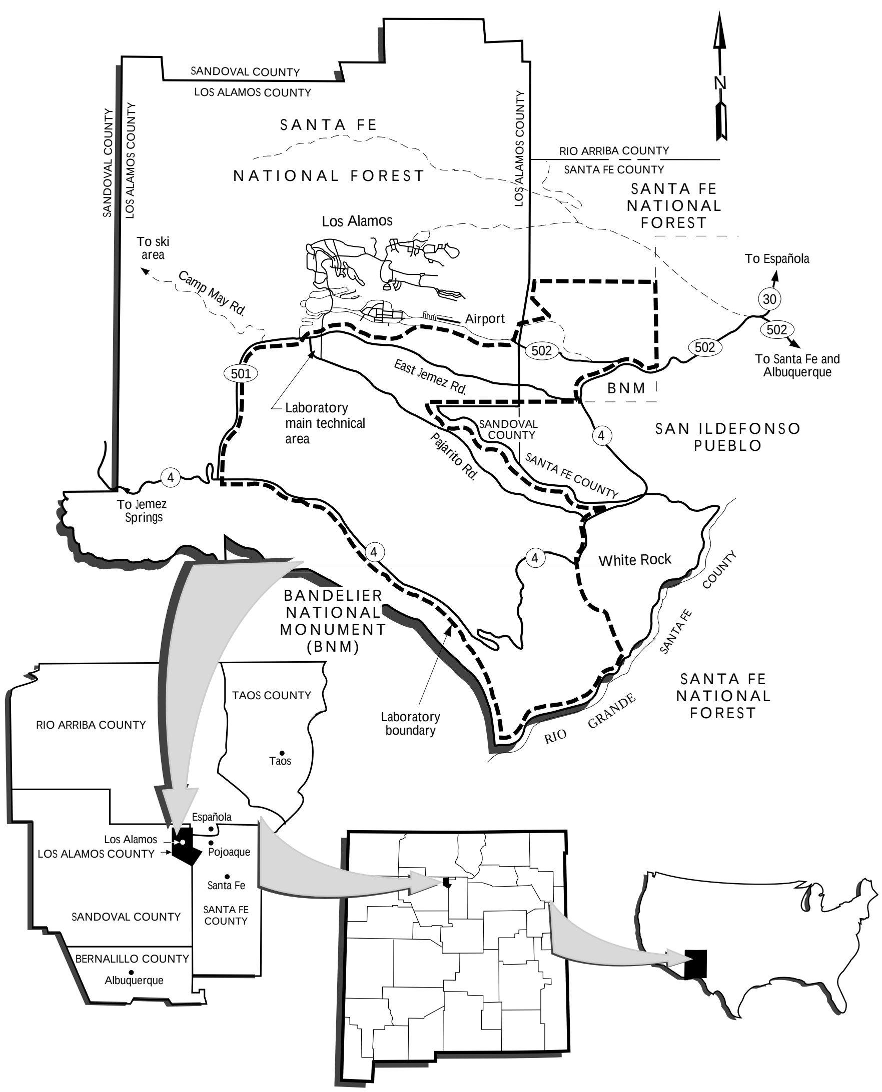
The Laboratory was founded in 1943 as part of the Manhattan Project, whose members assembled to create the first nuclear weapon. Occupying the campus of the Los Alamos Ranch School, American and British scientists gathered on the isolated mesa tops to harness recently discovered nuclear power with the hope of ending World War II. In July 1945, the initial objective of the Laboratory, a nuclear device, was achieved in Los Alamos and tested in White Sands, New Mexico. Today the Laboratory continues its role in defense, particularly in nuclear weapons, including developing methods for safely handling weapons and managing waste.

The 43 square miles of the Laboratory are divided into 47 technical areas that are used for building sites, experimental areas, waste disposal locations, roads and utilities, and safety and security buffers. An experimental area is located west of the Laboratory in Sandoval County at Fenton Hill. The Laboratory shares the county with two residential communities: Los Alamos townsite and White Rock. Most of the land surrounding the Laboratory is undeveloped, owned by the Pueblo of San Ildefonso, the Bureau of Land Management, the Santa Fe National Forest, the General Services Administration, and Bandelier National Monument, or is rural, supported by ranching and light farming. Santa Fe, the state capital, is 25 miles southeast of Los Alamos; Española is located 20 miles to the east; and Albuquerque, New Mexico's largest city, is 60 miles to the south-southwest. In 1994, approximately 234,000 people lived within a 50-mile radius of the Laboratory. The Laboratory and its contractors employed over 14,000 people; the Laboratory is the largest employer in Los Alamos County and northern New Mexico. Other local economic activity is fostered by technology transfer and tourism.

Diversity is inherent in the geography and ecology of Los Alamos. The terrain of the Pajarito Plateau, where Los Alamos is situated, alternates between mesas and deep canyons. The natural borders of Los Alamos—the Rio Grande and the Jemez Mountains—are significantly lower and higher in elevation than the mesas, which range from 6,200 feet to 7,800 feet. Six vegetation types—piñon-juniper, mixed conifer, Ponderosa pine, juniper-grassland, spruce-fir, and subalpine grassland are well-represented in the Los Alamos environs. Hundreds of species of wildlife, ranging from aquatic invertebrates to large mammals, reside on or near Laboratory property. In 1977, the Department of Energy designated the Laboratory as a National Environmental Research

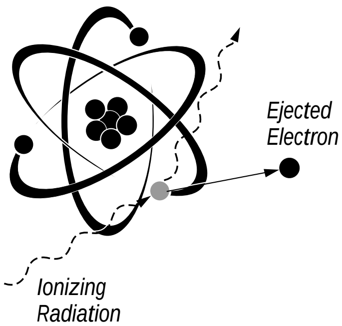
Park, where research may be carried out to preserve, recover, and fortify the environment. Researchers from the Laboratory use the opportunity to study the wildlife and plant life of northern New Mexico but also attempt to track the effects of past and present Laboratory activities on the local ecosystems.

For the past twenty years, the Laboratory has published an annual environmental report. This pamphlet offers a synopsis that briefly explains important concepts, such as radiation, and provides a summary of the monitoring results and regulatory compliance status that are explained at length in *Environmental Surveillance at Los Alamos during 1994*. This information is organized in five sections: the Fundamentals of Radiation, 1994 Risk Estimates, Environmental Programs at Los Alamos National Laboratory, Environmental Monitoring, and Environmental Compliance. Please call the Environmental Reports Team of ESH-20 at 665-0231 if you have any questions about this pamphlet.

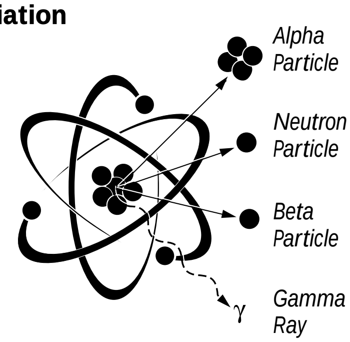


The Fundamentals of Radiation

Ionization



Ionizing Radiation



Much attention is focused on the Laboratory's use of materials containing radiation. Many of the Laboratory's activities include handling radioactive materials or operating radiation-producing equipment. But what is radiation? Why does it merit special attention?

To understand radiation, we must first understand the atom. Submicroscopic in size, atoms are the smallest units of chemical elements. But even the tiny atom can be divided into smaller components: protons, neutrons, and electrons. The protons and neutrons are bound together in the center of the atom, the nucleus, which is encircled by the electrons. A stable atom has the proper combination of protons and neutrons. When the balance of protons and neutrons is disturbed, the atom becomes unstable. In an attempt to achieve stability, the atom will break down, or decay; atoms of different elements decay at different rates. Energy, in the form of particles or waves, is released as atoms decay. This energy is called radiation. Radiation is emitted by the unstable isotopes of elements, that is, atoms with unbalanced numbers of protons and neutrons.

Radiation is classified according to whether or not it can strip electrons from an atom. Nonionizing radiation does not contain enough energy to remove electrons from an atom. Visible light, radio waves, and microwaves are examples of nonionizing radiation. Ionizing radiation, which possesses enough energy to eject electrons, is found in several forms, including alpha particles, beta particles, gamma rays, and x-rays.

Ionizing radiation requires special attention because its effects can be damaging to people. If the atoms inside a human cell are ionized, the cell's structure may be affected, and the cell may die. In some cases, however, this is desirable. Ionizing radiation is used positively to combat cancer. Radiation treatments damage the reproductive capabilities of a cell or the cell itself, slowing the spread of the disease.

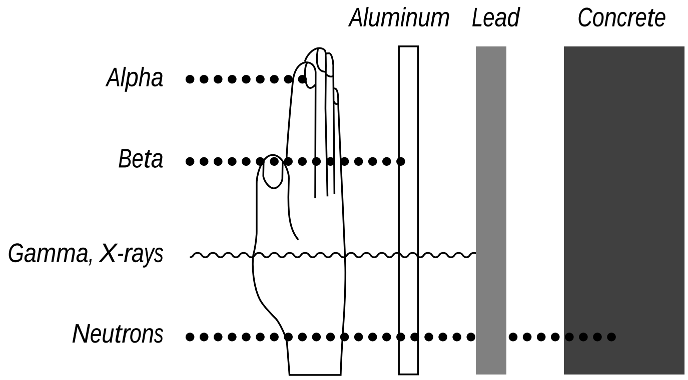
Background Radiation

Although some radiation is manufactured by human activities, most of it can be attributed to natural sources. Naturally occurring radiation, also called background radiation, is received by the Earth and its inhabitants every day. Although our understanding of radiation is relatively new and constantly being enhanced, radiation has always been a part of life on Earth. Radon in the air, uranium in rocks and soil, potassium fundamental to our bodies, and ultraviolet rays from the sun all contribute to the yearly natural exposure to radiation. Exposure to natural radiation depends partially on where one lives and what house-building materials are used.

Human-produced Radiation

Radiation is also produced by medical procedures and industry. Medical x-rays are a source of radiation, as are consumer products such as tobacco products, porcelain dentures, televisions, smoke detectors, and microwave ovens. Some of the radiation in the environment is beyond an individual's control. It is due to fallout from past weapons testing in various countries and nuclear research.

Types of Radiation



Shielding

Alpha particles are heavy and slow, with very little ability to penetrate the body. Alpha radiation can be stopped with a sheet of paper or an intact layer of skin. Its danger arises from inhalation or absorption through open skin; once inside the body, alpha radiation can damage sensitive tissues.

Beta particles are lighter and faster than alpha particles, with greater penetrating ability. Clothes, wood, aluminum, and plexiglass are effective shields from beta particles. Externally, beta radiation may harm skin or eyes; internally, it can damage tissues.

X-rays and gamma rays travel over long distances and easily penetrate the body. Shields of lead, concrete, or steel are required to block x-rays and gamma rays, which pass through and can damage human tissue.

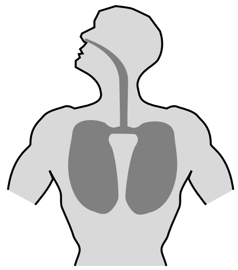
Neutrons are uncharged heavy particles contained in the nucleus of every atom heavier than hydrogen. They induce ionization only indirectly in atoms which they strike, but can thus damage body tissue. In general, efficient shielding against neutrons can be provided by water.

Pathways

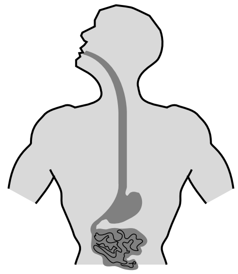
Both background and human-produced radiation have the potential to reach the public. A pathway outlines the route a radioactive contaminant may follow to reach the human population. Radioactive releases (ionizing radiation) may enter the local ecosystem by air or water and pass through soil, plants, livestock, or wildlife, ultimately reaching humans via food consumption. Alternatively, radioactive materials may be inhaled directly from the air. At the Laboratory, radioactive releases from all projects are strictly controlled to limit public exposure.

Routes of Entry

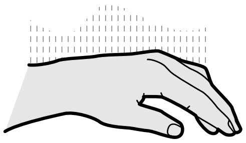
Inhalation:
Breathing,
Smoking



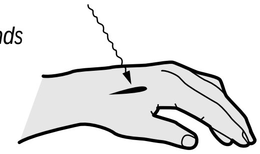
Ingestion:
Eating,
Drinking,
Chewing



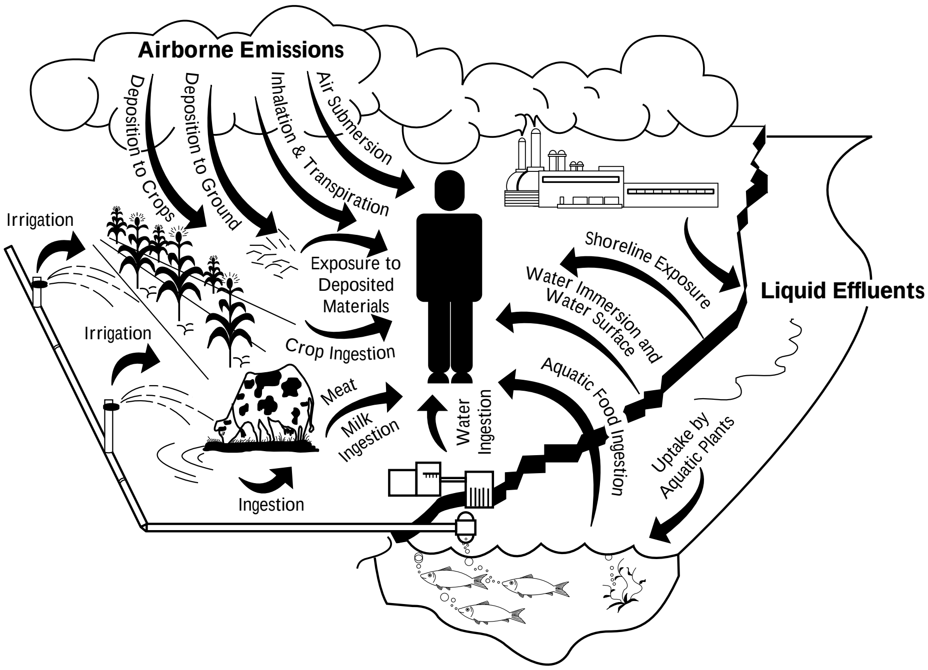
Absorption:
Through Skin



Absorption:
Through Wounds

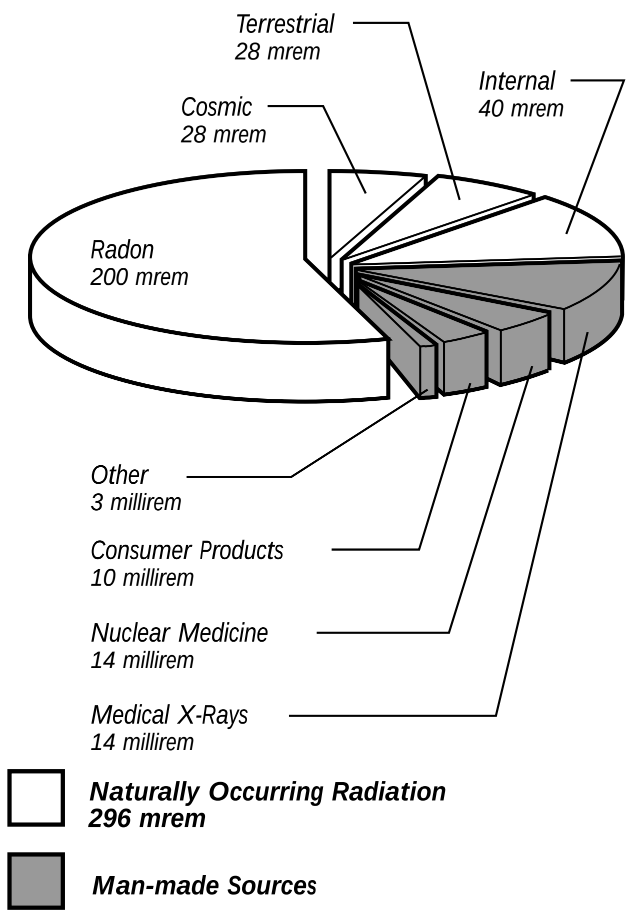


Pathways



There are many ways people can be exposed to radioactivity released from a nuclear facility. Radioactivity can leave the facility in airborne emissions or liquid effluents and end up in the food people eat or in the air they breath.

National Average Annual Dose



Dose

The effects of radiation are related to dose, the amount of radiation received. To protect worker and public health and safety, the Department of Energy maintains dose limits based on guidance from the Environmental Protection Agency, the National Council on Radiation Protection and Measurements, and the International Commission on Radiological Protection. Radiation doses are measured in millirems and typically are assessed for the exposure of a full year. The maximum doses permitted at Department of Energy sites are in addition to radiation from background, medical, or consumer sources. The Department of Energy's public dose limit is 100 millirem per year from all pathways: external exposure, inhalation, and ingestion. Estimates for radionuclide inhalation are adjusted for living indoors (shielding). Estimates for radionuclide ingestion are adjusted for the annual food consumption rate. The Environmental Protection Agency limits the effective dose equivalent (an estimate of the total risk of potential effects from radiation exposure) to any member of the public from radioactive airborne releases from the Laboratory to 10 millirem per year. Each agency has a specific way of calculating dose that involves unique computer methods and assumptions about shielding.

Units of Measurement

Roentgen (R)

The roentgen is a unit for measuring exposure. It is defined only for the effect on air and applies only to gamma and x-rays in air. It does not relate biological effects of radiation to the human body.

1 roentgen = 1000 milliroentgen (mR)

Radiation absorbed dose (rad)

The rad is a unit for measuring energy absorbed in any material. Absorbed dose results from energy being deposited by the radiation. It is defined for any material. It applies to all types of radiation and does not take into account the potential effect that different types of radiation have on the body.

1 rad = 1000 millirad (mrad)

Roentgen equivalent man (rem)

The rem is a unit for measuring dose equivalence. It is the most commonly used unit and pertains to only people. The rem takes into account the energy absorbed (dose) and the biological effect on the body (quality factor) due to the different types of radiation.

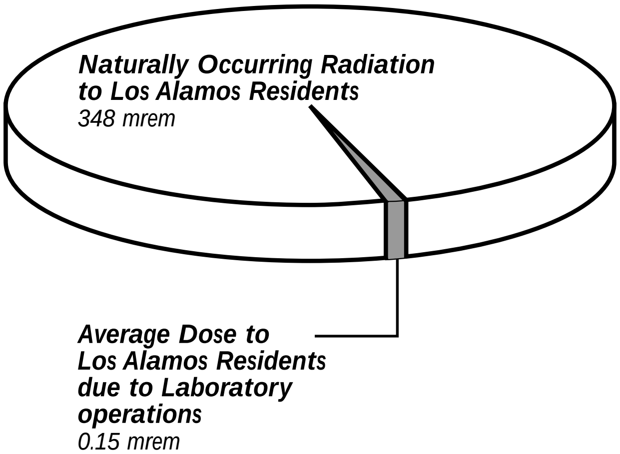
rem = rad x quality factor
1 rem = 1000 millirem (mrem)

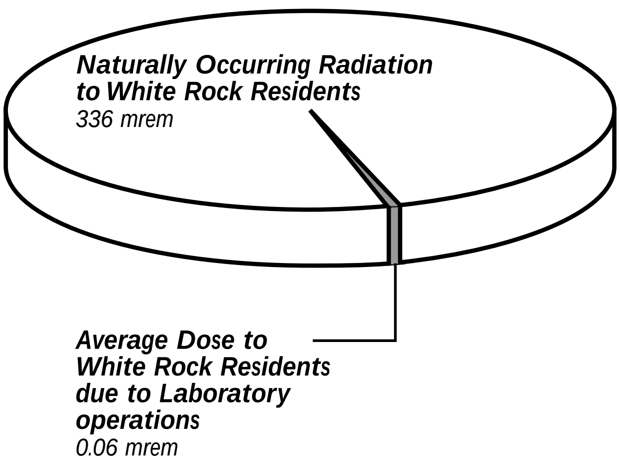
1994 Risk Estimates

Radiation from cosmic rays, terrestrial radiation, and radon contribute the most to an individual's estimated dose. The maximum amount of radiation a person could have received due to Laboratory operations is 3.5 millirems. During the 1994 calendar year, an *average resident* of Los Alamos townsite received 348 millirem from all sources, with 0.15 millirem due to Laboratory operations. In 1994, an *average resident* of White Rock received 336 millirem from all sources, with 0.06 millirem due to Laboratory operations. Naturally occurring radiation, medical exposure, and consumer products compose the balance of the average dose. There is more naturally occurring radiation in Los Alamos and White Rock residential areas as compared to the national average because of the high altitude and naturally occurring uranium.

The risk of cancer mortality for every United States resident is one chance in five. The added risk to any individual of cancer mortality due to Laboratory operations is less than one chance in one million.

Summary of Annual Effective Dose Equivalents Attributable to 1994 Laboratory Operations





Environmental Programs at Los Alamos National Laboratory

Many of the activities and operations at the Laboratory involve or produce liquids, solids, and gases that contain radioactive and/or nonradioactive hazardous materials. Such activities include conducting research and development programs in basic and applied chemistry and physics, testing and manufacturing explosives, cleaning chemically contaminated equipment, and working with radioactive materials. Laboratory policy requires that operations be performed in a manner that protects the environment and addresses compliance with applicable federal and state environmental protection regulations. This policy is in accordance with Department of Energy requirements to protect the public, environment, and worker health and to comply with applicable environmental laws, regulations, and orders. The Laboratory spent approximately 17% (or $184 million) of its 1994 operating budget on environmental programs designed to comply with this policy.

Environmental Protection

Personnel in the Laboratory's Environmental Safety and Health Division prepare permits, interpret regulations, perform and document environmental monitoring and compliance activities, and provide technical advice in the areas of air, water, sediments, soil, food, biota, and hazardous materials. Data are also gathered on measurements of natural radiation and Laboratory radiation sources. Weather conditions are monitored to assess the movement of airborne contaminants to the environment. The Environmental Safety and Health Division also conducts cultural and biological investigations across the site.

Environmental Restoration

The Laboratory's Environmental Restoration Project was established to identify the extent of possible contamination from Laboratory activities and the appropriate means for restoring contaminated areas to comply with applicable laws and regulations. The Resource Conservation and Recovery Act governs these activities. More than 2,500 potential release sites have been identified at the Laboratory. Potential release sites are areas that may have been contaminated over the past 50 years and range from the size of a table top to areas of several acres. These sites include past disposal sites as well as areas where spills of hazardous materials have been reported. The Environmental Restoration Project is also responsible for decontaminating and decommissioning sites and facilities that are considered surplus, such as old buildings that are no longer in use.

Waste Management

A Waste Management program is in place at the Laboratory to monitor, treat, dispose, and/or safely store radioactive waste, hazardous chemical waste, nonhazardous waste, and municipal-type sanitary waste. In 1994, activities at the Laboratory generated 94,400 cubic feet of radioactive waste, 9,000 cubic feet of hazardous chemical waste, and 52,900 cubic feet of nonhazardous waste. Approximately 27% of the total volume of the Los Alamos County landfill is generated by the Laboratory. No high-level radioactive wastes are generated at the Laboratory. Pollution prevention and waste minimization activities are part of the Waste Management program. Accomplishments in 1994 include recycling or reusing more than 1,000 tons of materials that would have been sent to local landfills—from lead batteries and waste oil to office furniture and books—and distributing quarterly memos identifying excess chemicals available for exchange. An estimated 65% to 70% of chemicals available for exchange were successfully exchanged instead of disposed.

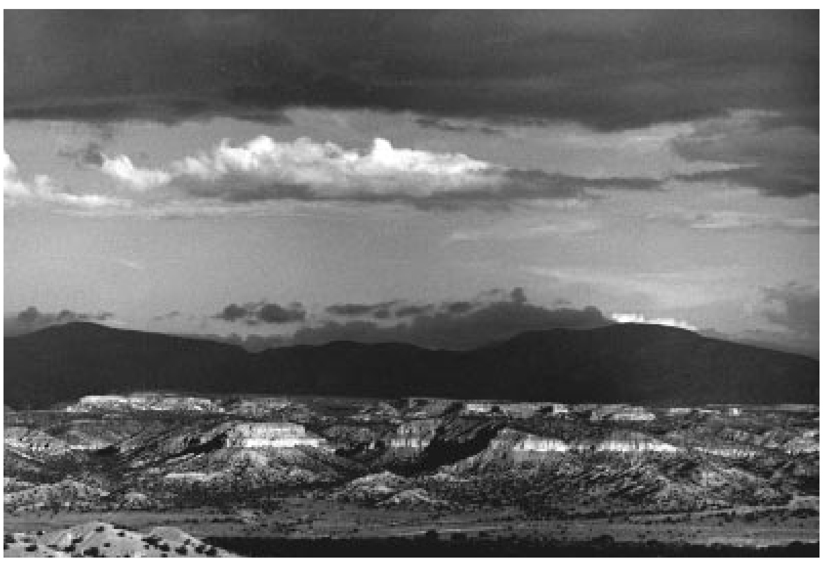
Quality Assurance

The Laboratory is committed to being a quality research and development center. Quality appraises the level at which a service or product meets or exceeds requirements and expectations. Laboratory workers, regulatory organizations such as the Environmental Protection Agency, sponsoring organizations such as the Department of Energy, and the residents and merchants of the Los Alamos townsite, White Rock, and other northern New Mexico communities act as customers and stakeholders who deserve quality from the Laboratory.

The Laboratory adheres to a three-fold management process to ensure quality. First, the Laboratory seeks to comply with Department of Energy orders, New Mexico environmental laws, and Environmental Protection Agency federal standards. Training programs are established to inform workers of the policies under which the Laboratory operates so that workers may perform their tasks in an appropriate manner. The second aspect of the Laboratory process is to continuously improve performance. The third part of the process is an assessment program, which includes

self-assessments, group assessments, management assessments, and audits from agencies outside the Laboratory. Operations and workers are held to these standards and procedures in order to best serve the Laboratory's customers and stakeholders and to constantly improve that service.

In the arena of environment, safety, and health, the Laboratory maintains air and water monitoring stations specifically to collect data samples for quality checks. This monitoring is required by state and federal standards, but is also a part of the Laboratory's commitment to help ensure the safety of the public and the environment.



Environmental surveillance - is the collection and analysis of samples, or direct measurements, of air, water, sediments, soils, foodstuffs, and plants and animals for the purpose of determining compliance with applicable standards and permit requirements, assessing radiation exposures of members of the public and assessing the impacts on the environment.

Environmental monitoring - is the collection and analysis of samples, or measurements, of liquid and gaseous liquid effluents and gaseous emissions for the purpose of characterizing and quantifying contaminants.

Environmental compliance - is the documentation, through environmental surveillance, that the Laboratory complies with the multiple federal and state environmental statutes, regulations, and permits that are designed to ensure environmental protection.

Several groups at the Laboratory are responsible for monitoring air, surface water, drinking water, groundwater, sediments, soils, and foodstuffs in order to track radioactive and nonradioactive substances in the environment. The release of large quantities of these materials, which are pollutants, may be harmful to health or the environment, so the Laboratory measures its emissions (gaseous waste discharged to the environment) and effluents (liquid waste discharged to the environment). Environmental monitoring samples are drawn from over 450 stations located inside the Laboratory's boundaries and up to 75 miles away, including all of Los Alamos County and portions of Santa Fe, Rio Arriba, Sandoval, and Taos counties. In 1994, approximately 200,000 analyses for chemical and radioactive constituents were performed on more than 11,000 environmental samples.

Air

Levels of external penetrating radiation (radiation originating from a source outside the body, including x-rays and gamma rays and charged particle contributions from cosmic, terrestrial, and man-made sources) are measured with thermoluminescent dosimeters, which contain a material (the Laboratory uses lithium fluoride) that emits light after being exposed to radiation. The amount of light the thermoluminescent dosimeter emits is proportional to the amount of radiation it was exposed to. The thermoluminescent dosimeter measurements indicate no detectable radiological impact to humans or the environment from Laboratory operations due to external penetrating radiation in 1994.

Air monitoring stations record levels of various radioactive contaminants, or radionuclides, in the air. Levels of alpha and beta particles, tritium, plutonium, americium, uranium, and iodine are measured. The concentration levels permitted in the air are controlled by the Department of Energy's derived air concentration guides and Environmental Protection Agency regulations. In 1994, the results of alpha and beta particles and americium sampling showed no activity above background. Each of the other contaminants showed activity, but all recorded less than 0.1% of the amount allowed by the Department of Energy's guides. Releases of tritium were a fraction of the Environmental Protection Agency's maximum allowable release; the highest concentrations were found on Laboratory property. The levels of uranium recorded were heavily influenced by uranium in the soil and in dust particles. As uranium loses electrons and decays, its atoms take on the properties of gaseous radon atoms. New Mexico soil is naturally high in uranium, and the air contains a proportionally high level of radon gas.

Laboratory air monitoring stations also measure levels of nonradioactive pollutant gases. For 1994, all emissions from the Laboratory steam plants, power plants, and asphalt plants and from detonating and burning explosives, removal of asbestos, and beryllium operations met federal standards for air quality. Some ozone readings exceeded state standards but matched equally high levels elsewhere in the state; ozone levels are unaffected by Laboratory activities. Visibility readings, an indicator of air quality, were good; most days in 1994 had visibility of over 70 miles.

Comparison of 1993 and 1994 Releases of Radionuclides from Laboratory Operations

Airborne Emissions

Radionuclide	Units	Activity Released 1993	Activity Released 1994	Ratio 1994:1993
Tritium	Ci	2,100	1,100	0.5
Uranium	µCi	270	380	1.4
Plutonium	µCi	6	13	2.2
Gaseous mixed activation products	Ci	32,100	50,200	1.6
Mixed fission products	µCi	1,360	450	0.3
Particulate/vapor activation products	Ci	13	0.4	0.03
Total	Ci	34,200	51,300	

Liquid Effluents

Radionuclide	Activity Released (mCi) 1993	Activity Released (mCi) 1994	Ratio 1994:1993
Tritium	2,660.00	2,230.0	0.84
Strontium-82, -85, -89, -90	7.64	37.0	4.84
Cesium-137	8.17	8.5	1.04
Uranium-234	0.12	0.12	1.0
Plutonium-238, -239, -240	1.08	3.25	3.01
Americium-241	11.20	3.06	0.273

Ci = Curie, which is the standard unit of measuring radioactivity;
1 Ci = 3.7 x 10^{10} nuclear transformations per second.
mCi = milliCurie, or 0.001 of a Curie
µCi = microCurie, or 0.000001 of a Curie

Water

Within the Laboratory boundary, sources of surface water include spring snowmelt, summer storm runoff, and flow from outfalls that are permitted by the National Pollutant Discharge Elimination System. Surface water is monitored within the Laboratory, at the Laboratory perimeter, and at regional stations within 75 miles of the Laboratory boundary. Levels of plutonium, tritium, strontium, americium, uranium, cesium, alpha and beta particles, and gamma rays are measured at these stations. In 1994, all measurements were below the Department of Energy's derived concentration guides that limit potential exposure to the public for radioactive effluents in water. There has been a general downward trend in radioactive liquid effluents over the past three and a half decades. Surface water is also monitored for releases of nonradioactive chemicals used in Laboratory operations, such as acetone, chloroform, copper, cadmium, and chromium. According to measurements taken in 1994, none of the samples exceeded standards for water supplies for livestock and wildlife. Surface waters at the Laboratory are not a source of drinking or household water.

Groundwater is monitored to determine its quality. The main aquifer beneath Los Alamos is the primary source of drinking water for the Laboratory and the county. Operations at the Laboratory and discharges from county sewage treatment plants have resulted in detectable changes in water chemistry in some parts of the main aquifer. Based on Environmental Protection Agency standards, however, these small changes have not degraded drinking water quality and are not a human health concern. There has been no

significant depletion of the aquifer or detectable contamination. Several test wells showed trace levels of tritium due to Laboratory operations, but the levels were far below Environmental Protection Agency limits. The test wells are used for surveillance and are not part of the water supply system. None of the water supply wells have shown levels of tritium above natural background values.

Sediments

Sediments are monitored on site and off site within a 2.5-mile perimeter radius and a 50-mile regional radius of the Laboratory region for the presence of radioactive tritium, uranium, plutonium, cesium, and strontium. In 1994, data from sediment sampling were consistent with results from previous years; none of the sediment samples showed any concentration of radioactive substance that exceeded screening action levels (the level at which cleanup activity is required). Sediments are monitored for trace metals, such as antimony and mercury, and organic contaminants, such as polychlorinated biphenyls (PCBs). The 1994 results showed no concentrations above natural levels for trace metals and organic contaminants.

Soils

Soils are monitored both on and off site for radioactive tritium, strontium, cesium, uranium, plutonium, americium, alpha and beta particles, and gamma rays. All levels were within acceptable values, and no action was required to reduce levels of any radioactive element in the soil. In soil samples, one on-site higher-than-background concentration of plutonium was recorded, but this concentration was still far below the screening action level. Soils are analyzed for trace and heavy metals, such as iron, lead, mercury, and aluminum. In 1994, all samples were within acceptable levels for the Los Alamos region. Although some on-site readings for beryllium and arsenic were above background levels, the sources were natural; therefore, no action was required by the Laboratory.

Foodstuffs

Foodstuffs are sampled for radioactivity to determine the Laboratory's impact on the food chain. Honey, produce, fish, milk, and game are sampled as potential pathways for radiation to reach humans.

Honey from the White Rock/Pajarito Acres residential area contained higher-than-background concentration of tritium. Honey from hives located within the Laboratory boundary is not available for public consumption.

Fish from reservoirs upstream (Abiquiu, Heron, and El Vado) and downstream (Cochiti) of the Laboratory were sampled for radioactive contaminants. The concentrations of cesium, uranium, strontium, and plutonium were not

significantly different in game fish collected from Cochiti Reservoir as compared to game fish collected from reservoirs located upstream of the Laboratory. In surface-feeding and bottom-feeding game fish, elevated levels of uranium were found. The higher uranium was attributed to naturally occurring uranium in the sediment they consume. From 1981 to 1994, downward trends in measured amounts of radionuclides were found in both bottom-feeding and surface-feeding fish.

Milk samples were collected from the working dairy that is nearest to the Laboratory. All radionuclides found in their milk samples were comparable to background.

Produce samples were collected from gardens around the perimeter of the Laboratory. No significant contributions of radionuclides were detected above that from natural and/or world-wide fallout levels.

The Laboratory operates under all applicable federal and state environmental, safety, and health laws, codes, orders, and standards. Environmental regulatory agencies include the Environmental Protection Agency and the New Mexico Environment Department. The Department of Energy issues orders that also regulate environmental activities at the Laboratory. The Laboratory is subject to the following laws:

Resource Conservation and Recovery Act (RCRA) and its Hazardous and Solid Waste Amendments (HSWA)

RCRA requires the Laboratory to regulate hazardous and solid waste, from its generation to its disposal. RCRA requires the Laboratory to attempt to reduce the amount of hazardous waste produced, the toxicity of generated hazardous waste, and to treat hazardous waste before its disposal. In 1994, the New Mexico Environment Department issued two Compliance Orders to the Laboratory involving hazardous waste management. The Laboratory corrected the findings in the Compliance Orders, or wrote action plans explaining how they planned to correct the findings, and paid fines totaling $75,700 to the state. The Laboratory did not receive any Notices of Violation from RCRA regulators in 1994. During 1994, no underground storage tanks were removed. The Environmental Restoration program remained in compliance with Module VIII of the RCRA/HSWA permit during 1994.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

CERCLA outlines the appropriate responses to certain substance releases to the environment. Based on site assessments and inspections, the Environmental Protection Agency ranks potentially health threatening or environmentally unsound hazards at facilities. Special attention is given to these hazardous sites, which are maintained on a National Priority List. The Laboratory is not included on the National Priority List.

Emergency Planning and Community Right-to-Know Act (EPCRA)

EPCRA requires industrial production facilities to report their emissions to the environment. Only the Laboratory's Plutonium Processing Facility is engaged in production sufficiently large to reach the minimum reporting levels required by the EPCRA. The only regulated chemicals used at the facility in quantities large enough to report under EPCRA are nitric acid, used in plutonium processing; chlorine, used for water treatment; and sulfuric acid, used to deionize water. Approximately 171 pounds of nitric acid, 839 pounds of chloroform, 26 pounds of chlorine, and less than a pound of sulfuric acid were released to the atmosphere during 1994.

Toxic Substances Control Act (TSCA)

TSCA manages chemicals that may pose risks to humans or the environment. TSCA regulates the Laboratory's use, storage, handling, and disposal of PCB products and equipment. PCBs are commonly found in oil products and may cause adverse health effects in humans. In 1994, the Environmental Protection Agency conducted an audit of the Laboratory's PCB management program. Although several deficiencies were found, the Environmental Protection Agency did not take enforcement action. The Laboratory is working to overcome these deficiencies and maintain safe PCB handling. Approximately 223,000 pounds of PCB-contaminated materials and equipment were disposed of during 1994. Four PCB transformers were removed and replaced with non-PCB units.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA regulates the manufacturing and application of pesticides. The Laboratory is subject to FIFRA and the New Mexico Pest Control Act, which is administered by the New Mexico Department of Agriculture. No deficiencies in the Laboratory's pesticide application program were found during the annual inspection in 1994.

Clean Air Act (CAA) and Air Quality Control Regulations (AQCRs)

The CAA and the AQCRs are federal and state codes concerning air quality and emissions. Both radioactive and nonradioactive emissions to the air are screened carefully to protect humans, the ozone layer, and the environment. The Laboratory's radioactive emissions during 1994 were in compliance with the Environmental Protection Agency's effective dose equivalent limit of 10 millirem per year to members of the public from airborne emissions. The Laboratory was in compliance will all federal nonradiological ambient air quality standards. The Laboratory continued negotiations with the Environmental Protection Agency to comply with stack monitoring requirements.

Clean Water Act (CWA)

The CWA strives to maintain the integrity of the United States' waters. Before water is discharged, it must meet standards established by the National Pollutant Discharge Elimination System (NPDES). In 1994, 100% of the domestic, sanitary waste discharges at the Laboratory were in compliance with NPDES, as were 98.6% of the industrial, processing waste discharges. In addition to having NPDES permits, the Laboratory has a Spill Prevention Control and Countermeasures Plan that provides containment for accidental spills and thereby reduces the effect of any spill on the environment.

Safe Drinking Water Act (SDWA)

Drinking water for Los Alamos County and Bandelier National Monument is supplied by the Department of Energy and its standards maintained by the Environmental Protection Agency-backed authority of the New Mexico Environment Department. To ensure compliance with the SDWA, drinking water is sampled at various points in Los Alamos County, both on and off Laboratory property. Samples are analyzed for biological organisms, organic and inorganic constituents such as lead, copper, beryllium, and fluoride, and radioactive materials. Although levels were low enough not to require it, drinking water was monitored for alpha and beta activity. Drinking water was also monitored for radon, which naturally appears when uranium decays. During 1994, no actions were required to reduce the radon level in drinking water. In the future, drinking water may be required to be held in storage tanks to allow the radon to dissipate during its half-life of twelve days.

National Environmental Policy Act (NEPA)

NEPA requires federal agencies to consider the environmental impact of their actions before deciding to proceed with those actions. NEPA's objective is to maintain or restore compatibility between humanity and the environment, in the present and in the future. The Department of Energy, as the Laboratory's sponsoring agency, is responsible for preparation and approval of NEPA documents. Personnel in the Environmental Protection Group reviewed 904 proposed Laboratory projects for NEPA during 1994.

NEPA also obligates the Laboratory to assess the impact of its projects on cultural resources; endangered, threatened, or sensitive species; and floodplains and wetlands. The protection of these resources is supported by the following legislation:

National Historic Protection Act, Native American Graves Protection and Repatriation Act, and American Indian Religious Freedom Act

Endangered Species Act, New Mexico Wildlife Conservation Act, and New Mexico Endangered Plant Species Act

Executive Orders pertaining to floodplain management and the preservation of wetlands.

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